

WHAT IS CLAIMED IS:

1. An electric actuator comprising:
  - a bottom-contained casing;
  - a motor in said casing;
  - a motor shaft for the motor, extending through an opening of the casing;
  - a housing fixed to the opening of the casing;
  - a worm on a portion of the motor shaft in the housing;
  - a worm wheel rotatably mounted to the housing to mesh with the worm;
  - a first radial bearing which supports the motor shaft between an axial end and the worm of the motor shaft;
  - a second radial bearing which supports the motor shaft opposite the axial end near the worm; and
  - a thrust bearing at the bottom of the casing to support the motor shaft.
2. An actuator as claimed in claim 1 wherein the first and second bearing are made of metal and equidistantly spaced from the worm.
3. An actuator as claimed in claim 1 wherein the first bearing is smaller in external diameter than the second bearing.
4. An actuator as claimed in claim 1 wherein the thrust bearing comprises a thrust-radial ball bearing to support the motor shaft rotatably.
5. An actuator as claimed in claim 4 wherein a bore which projects from the bottom of the casing is formed, an inner race of the thrust-radial ball bearing being fixed to an axial end portion of the motor shaft, an outer race being fixed to an inner circumferential wall of the bore.

6. An actuator as claimed in claim 4 wherein an inner race of the thrust-radial ball bearing is engaged on a smaller-diameter portion of the motor shaft, a female thread of a lock nut meshing with a male thread of the smaller-diameter portion of the motor shaft.
7. An actuator as claimed in claim 4 wherein an inner race of the thrust-radial ball bearing is engaged on a smaller-diameter portion of the motor shaft, the thrust-radial ball bearing being held by welded or padded portion of the smaller-diameter portion or the casing.
8. An actuator as claimed in claim 7 wherein the welded or padded portion is formed by radiating a laser beam.
9. An electric actuator comprising:
  - a bottom-contained casing;
  - a motor in said casing;
  - a motor shaft for the motor and which extends through an opening of the casing;
  - a housing fixed to the opening of the casing;
  - a worm on a portion of the motor shaft in the housing;
  - a worm wheel rotatably mounted to the housing to mesh with the worm;
  - a first radial bearing which supports the motor shaft between an axial end and the worm of the motor shaft;
  - a second radial bearing which supports the motor shaft opposite the axial end near the worm;
  - a thrust bearing at the bottom of the casing to support the motor shaft;
  - a rotary disc which is fixed to the motor shaft to rotate together with the motor shaft;
  - a rotation detector for detecting an angle of rotation electrically; and

encoding means for converting the angle of rotation into a digital signal.

10. An actuator as claimed in claim 9 wherein direction of rotation is detected by the rotation detector in addition to the angle of rotation with both of the angle and direction of the rotation being converted into a digital signal by the encoding means.

11. An actuator as claimed in claim 9 wherein the encoding means comprises an electronic circuit on an electronic circuit substrate.

12. An actuator as claimed in claim 9 wherein the outer circumferential surface of the rotary disc has magnetic material in which a magnetic pole is directed in a rotational direction, said rotation detector being a hall element.

13. An actuator as claimed in claim 9 wherein the outer circumferential surface of the rotary disc has a slit through which light passes, or a black-and-white pattern which reflects or absorbs light, said rotation detector being a photo coupler.

14. An actuator as claimed in claim 9 wherein the electronic circuit has a non-volatile memory to measure the angle of rotation as absolute value.

15. An actuator as claimed in claim 9 wherein the electronic circuit has a memory in which stored data is kept by battery to measure the angle of rotation as absolute value.